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Forestry Canada - Maritimes Region

TECHNICAL NOTE

PLANTATION PEST ASSESSMENT SURVEY IN NEW BRUNSWICK IN 1990

Multi-agency plantation pest assessment surveys have been carried out in New Brunswick since 1986. The objective of the survey is to detect pest problems and to assess the level of damage. Continued increase in wood demand has led to an increase in the number of natural stands harvested, while a commitment to reforestation has led to an increase in the number of plantations. Tree growth and development are threatened by insects and diseases. Regular plantation pest assessment provides information on insect and disease damage that is helpful to forest managers in protecting their investments.

The large and ever-increasing number of plantations has necessitated the involvement of a number of organizations in plantation assessment. In 1990, the participating organizations were:

- Stone-Consolidated Inc. (SCI)
- Fraser Inc. (Fras)
- J.D. Irving Ltd. (JDI)
- N.B. Dept. of Natural Resources and Energy (DNR)

The Forest Insect and Disease Survey unit of Forestry Canada - Maritimes Region provided planning, training, co-ordination, identification services, analysis, and summary of data.

NURSERIES

PLANTATIONS

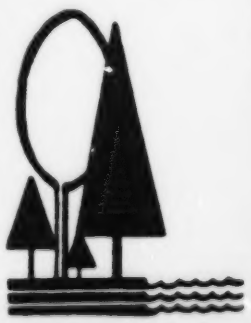
SILVICULTURE

UTILIZATION

ECONOMICS

TREE IMPROVEMENT

INSECTS AND DISEASES



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Assessments involved detailed examination of 50 trees in each of the plantations assessed. Ten subplots of five trees were selected along a pre-determined line of travel through the plantation. The distance between subplots varied according to the size of the plantation ensuring good coverage and adequate representation of conditions. Insects and/or diseases encountered between subplots or off the line of travel are recorded with other problems (Table 5.), but were not included in the calculations.

Total number of plantations surveyed in 1990 was 202, (Table 1.). Of these, 132 were spruce, 52 were pine and 18 were of other species. In addition, there were 17 thinned areas assessed.

A total of 10 756 trees were assessed, of which 93.8% were reported healthy. Severe or moderate damage was found on at least some of the trees in 107 (49%) of the 219 plantations and thinned areas surveyed (Table 4.).

The results of the survey are presented here in a series of tables, organized to show tree health conditions in plantations in the five DNR forestry management regions of New Brunswick.

A brief discussion of some of the plantation pests and problems follows the tables.

Table 1. Summary of plantation assessments by tree species and organization conducting field work in the various resource management regions in New Brunswick in 1990.

Region	Tree Species	Total plantations assessed	Organization			
			DNR	FRAS	JDI	SCI
1	Balsam fir	1	1	0	0	0
	Jack pine	9	9	0	0	0
	Black spruce	16	14	1	0	1
	White spruce	1	0	0	0	1
	Mixed spruce	2	2	0	0	0
	Mixed species	4	4	0	0	0
	Larch	1	1	0	0	0
	Total for Region	**34**	**31**	**1**	**0**	**2**
2	Jack pine	6	6	0	0	0
	Red pine	2	2	0	0	0
	Black spruce	7	7	0	0	0
	Red spruce	1	1	0	0	0
	Total for Region	**16**	**16**	**0**	**0**	**0**
3	Jack pine	12	12	0	0	0
	Black spruce	4	4	0	0	0
	White spruce	1	1	0	0	0
	Spruce (unspec.)	2	2	0	0	0
	Total for Region	**19**	**19**	**0**	**0**	**0**
4	Balsam fir	1	1	0	0	0
	Jack pine	9	8	0	1	0
	Red pine	4	4	0	0	0
	Black spruce	13	13	0	0	0
	White spruce	1	1	0	0	0
	Mixed spruce	1	1	0	0	0
	Mixed species	9	9	0	0	0
	Larch	1	1	0	0	0
	Total for Region	**39**	**38**	**0**	**1**	**0**
5	Jack pine	7	0	2	5	0
	Red pine	3	0	1	2	0
	Black spruce	51	2	31	18	0
	White spruce	26	1	3	22	0
	Norway spruce	2	0	0	2	0
	Mixed spruce	4	2	2	0	0
	Yellow birch	1	0	0	1	0
	Total for Region	**94**	**5**	**39**	**50**	**0**
	Total for New Brunswick	**202**	**109**	**40**	**51**	**2**

Table 2. Condition of trees by tree part as assessed in plantations and thinned areas in the management regions of New Brunswick in 1990.

Region	Number of trees	NEEDLES Frequency of Condition (%)					BUDS Frequency of Condition (%)					SHOOTS Frequency of Condition (%)				
		Healthy	Trace	Light	Mod.	Sev.	Healthy	Trace	Light	Mod.	Sev.	Healthy	Trace	Light	Mod.	Sev.
Pine																
1	446	82.7	12.6	3.6	1.1	0.0	99.3	0.4	0.0	0.2	0.0	85.2	10.1	4.0	0.2	0.4
2	399	70.4	22.8	6.0	0.8	0.0	100.0	0.0	0.0	0.0	0.0	99.7	0.3	0.0	0.0	0.0
3	585	75.2	20.5	3.1	1.0	0.2	99.3	0.5	0.0	0.2	0.0	96.1	3.4	0.0	0.2	0.3
4	642	90.3	1.7	5.6	1.9	0.5	99.7	0.0	0.0	0.3	0.0	91.9	3.7	2.2	1.6	0.6
5	494	83.8	7.3	5.7	1.8	1.4	99.8	0.0	0.0	0.2	0.0	93.7	0.4	4.9	0.8	0.2
PROVINCIAL AVERAGE		**81.2**	**12.2**	**4.8**	**1.4**	**0.4**	**99.6**	**0.2**	**0.0**	**0.2**	**0.0**	**93.3**	**3.6**	**2.2**	**0.6**	**0.4**
Spruce																
1	940	98.4	1.5	0.1	0.0	0.0	98.2	1.8	0.0	0.0	0.0	97.4	2.3	0.1	0.0	0.1
2	398	77.4	19.8	1.3	1.0	0.5	99.2	0.8	0.0	0.0	0.0	98.0	1.8	0.3	0.0	0.0
3	330	99.7	0.3	0.0	0.0	0.0	99.7	0.0	0.3	0.0	0.0	99.7	0.3	0.0	0.0	0.0
4	688	90.6	6.1	2.8	0.1	0.4	91.9	7.1	0.9	0.1	0.0	96.7	1.9	1.2	0.3	0.0
5	4101	87.9	9.1	2.4	0.7	0.1	91.9	2.0	5.5	0.5	0.1	87.0	0.1	8.9	2.9	1.1
PROVINCIAL AVERAGE		**89.6**	**7.9**	**1.9**	**0.5**	**0.1**	**93.7**	**2.3**	**3.6**	**0.3**	**0.0**	**90.9**	**0.7**	**5.8**	**1.9**	**0.7**
Other																
1	300	77.3	18.0	4.3	0.0	0.3	97.3	2.7	0.0	0.0	0.0	98.0	1.7	0.0	0.0	0.3
4	541	95.2	2.4	2.0	0.0	0.4	93.7	4.3	1.7	0.0	0.4	81.9	9.2	7.4	0.2	1.3
5	50	82.0	0.0	10.0	8.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
PROVINCIAL AVERAGE		**88.4**	**7.5**	**3.3**	**0.4**	**0.3**	**95.3**	**3.5**	**1.0**	**0.0**	**0.2**	**88.3**	**6.2**	**4.5**	**0.1**	**0.9**
Thinned																
1	100	98.0	2.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	65.0	10.0	21.0	4.0	0.0
2	249	81.5	17.7	0.0	0.8	0.0	94.4	5.6	0.0	0.0	0.0	91.6	8.4	0.0	0.0	0.0
3	47	100.0	0.0	0.0	0.0	0.0	89.4	8.5	0.0	2.1	0.0	95.7	4.3	0.0	0.0	0.0
4	446	99.3	0.0	0.0	0.4	0.2	96.6	3.1	0.0	0.0	0.2	93.3	3.6	2.0	0.0	1.1
PROVINCIAL AVERAGE		**93.9**	**5.5**	**0.0**	**0.5**	**0.1**	**96.0**	**3.8**	**0.0**	**0.1**	**0.1**	**89.5**	**5.8**	**3.6**	**0.5**	**0.6**

Number of trees: Although 50 trees are assessed in each plantation, the number of dead trees are subtracted from the total. Dead trees are not assessed by tree part and therefore can not be analyzed by tree part.

BRANCHES					STEMS					LEADERS			ROOTS	
Frequency of Condition (%)					Frequency of Condition (%)					Frequency of Condition(%)			Frequency of Condition(%)	
Healthy	Trace	Light	Mod.	Sev.	Healthy	Trace	Light	Mod.	Sev.	Healthy	Damaged	Dead	Healthy	Damaged
82.1	8.5	7.6	1.6	0.2	82.7	7.8	5.4	3.1	0.9	94.4	5.6	0.0	98.7	1.3
92.0	7.3	0.8	0.0	0.0	95.5	3.3	0.0	0.5	0.8	99.2	0.8	0.0	100.0	0.0
70.6	15.6	13.5	0.2	0.2	95.0	4.1	0.3	0.5	0.0	95.7	4.3	0.0	100.0	0.0
85.2	9.3	2.3	1.4	1.7	97.0	1.1	0.2	0.9	0.8	96.3	3.7	0.0	98.6	1.4
94.5	0.8	3.2	0.6	0.8	97.6	0.4	1.4	0.4	0.2	98.6	1.4	0.0	99.8	0.2
84.2	**8.7**	**5.7**	**0.8**	**0.7**	**94.0**	**3.2**	**1.3**	**1.1**	**0.5**	**96.7**	**3.3**	**0.0**	**99.4**	**0.6**
98.6	0.9	0.1	0.4	0.0	98.0	1.6	0.2	0.0	0.2	93.8	6.2	0.0	99.9	0.1
99.5	0.5	0.0	0.0	0.0	95.0	3.8	0.3	1.0	0.0	96.2	3.8	0.0	99.5	0.5
93.6	3.0	3.3	0.0	0.0	98.5	1.5	0.0	0.0	0.0	98.2	1.8	0.0	99.4	0.6
93.8	2.6	1.2	1.7	0.7	99.1	0.4	0.0	0.0	0.4	93.9	6.1	0.0	97.0	3.0
98.3	0.6	0.7	0.2	0.2	98.8	0.3	0.4	0.3	0.2	91.9	8.1	0.0	99.9	0.1
97.7	**0.9**	**0.8**	**0.4**	**0.2**	**98.4**	**0.8**	**0.3**	**0.3**	**0.2**	**93.0**	**7.0**	**0.0**	**99.5**	**0.5**
98.7	1.3	0.0	0.0	0.0	99.0	1.0	0.0	0.0	0.0	88.7	11.3	0.0	100.0	0.0
80.8	8.1	9.2	0.4	1.5	96.3	0.4	2.0	0.2	1.1	91.9	8.1	0.0	99.6	0.4
100.0	0.0	0.0	0.0	0.0	42.0	0.0	56.0	2.0	0.0	100.0	0.0	0.0	100.0	0.0
87.9	**5.4**	**5.6**	**0.2**	**0.9**	**94.2**	**0.6**	**4.4**	**0.2**	**0.7**	**91.2**	**8.8**	**0.0**	**99.8**	**0.2**
88.0	1.0	10.0	1.0	0.0	99.0	0.0	1.0	0.0	0.0	98.0	2.0	0.0	100.0	0.0
97.6	2.4	0.0	0.0	0.0	98.8	1.2	0.0	0.0	0.0	98.4	1.2	0.4	100.0	0.0
100.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	53.2	46.8	0.0	100.0	0.0
93.3	3.0	2.1	0.0	1.6	95.1	0.4	3.4	0.2	0.9	89.5	10.5	0.0	100.0	0.0
94.4	**2.4**	**2.3**	**0.1**	**0.8**	**96.9**	**0.6**	**1.9**	**0.1**	**0.5**	**91.1**	**8.8**	**0.1**	**100.0**	**0.0**

Table 3. The condition of trees in plantations and thinned areas in the Maritimes in 1990.

Province	Species	Tree Condition (%) Healthy	Fair	Poor	Dead
New Brunswick	Pine	91.8	4.6	2.3	1.3
	Spruce	94.3	2.9	1.2	1.6
	Other	94.3	3.3	1.3	1.0
	Thinned	94.7	3.2	1.2	0.9
	Average	93.8	3.4	1.4	1.4
Nova Scotia	Pine	92.1	4.0	3.1	0.9
	Spruce	91.8	5.4	1.8	1.1
	Other	94.5	1.5	2.8	1.3
	Average	91.9	4.9	2.2	1.1

Table 4. Plantations and thinned areas with at least some incidence of severe or moderate damage in the Maritimes in 1990.

Province	Species	Plantations Number Assessed	Frequency (%) with Moderate	Severe
New Brunswick	Pine	52	27	33
	Spruce	132	22	26
	Other	18	17	44
	Thinned	17	41	23
	Total	219		
	Frequency		24	29
Nova Scotia	Pine	37	35	35
	Spruce	108	27	30
	Other	8	37	0
	Total	153		
	Frequency		29	29
Regional Total		372		
Regional Frequency			26	29

Table 5. Comparison of problems at all levels of severity with those at moderate and severe levels as assessed in the plantation pest surveys in New Brunswick in 1990.

	Percentage of Plantations Affected							
	Pine		Spruce		Other		Thinned	
	Damage		Damage		Damage		Damage	
Problem:	all levels	Mod.& Sev.	all levels	Mod.& Sev.	all levels	Mod.& Sev.	all levels	Mod.& Sev.
Insects								
Aphid	12	8	30	4	6	6	6	-
Bud midge	-	-	21	-	-	-	-	-
Bud moth	-	-	17	-	-	-	6	-
Bark beetles	6	4	-	-	-	-	12	-
Budworm	12	2	-	-	-	6	-	-
Cone maggot	-	-	2	-	-	-	-	-
Conevorm	8	2	1	1	-	-	-	-
Forest tent caterpillar	-	-	-	-	-	-	6	6
Gall adelgid	2	-	11	-	17	6	18	-
Gall midge	-	-	12	9	-	-	6	-
Jack pine savfly	2	2	-	-	-	-	-	-
Leafhopper	-	-	-	-	-	-	6	-
Leafminer	-	-	-	-	6	6	6	6
Leaf tier	-	-	-	-	6	6	6	6
Northern pitch twig moth	25	2	-	-	6	-	6	-
Savfly	1	-	2	1	11	-	6	-
Skeletonizer	-	-	-	-	-	-	6	-
Spittlebug	6	-	4	-	-	-	6	-
Spruce bud midge	-	-	5	5	11	-	6	-
Spruce bud moth	-	-	25	12	6	-	6	-
Spruce budworm	-	-	11	7	11	6	-	-
Whitemarked tussock moth	-	-	1	-	-	-	-	-
White pine weevil	14	14	3	2	6	6	29	24
Diseases								
Canker	1	-	-	-	17	11	6	6
Globose gall rust	12	-	-	-	-	-	-	-
Leaf blister	-	-	-	-	6	6	-	-
Needle rust	19	10	10	2	11	6	24	6
Shoestring root rot	10	10	15	15	11	11	-	-
Other								
Animal	60	29	28	4	61	33	47	18
Competition: Hardwood	17	6	5	2	6	6	6	6
Softwood	2	-	2	2	6	-	6	6
Herbaceous	-	-	1	1	-	-	-	-
Unspecified	-	-	-	-	-	-	6	-
Development	-	-	12	3	6	-	24	6
Frost	4	4	15	5	6	-	18	6
Mechanical damage	12	6	15	2	33	17	41	24
Nutrient deficiency	2	-	3	2	-	-	-	-
Planting	14	6	8	5	17	17	12	6
Snow damage	42	14	17	9	6	6	-	-
Weather	10	6	1	-	-	-	-	-
Wind damage	10	2	3	1	6	6	12	6
Winter damage	2	-	3	1	6	-	-	-

Calculations are based on the number of plantations assessed of each species: Pine = 52, Spruce = 132, Other = 18, and Thinned = 17.

DISCUSSION:

Animal damage occurred in 60% of the pine plantations assessed. It was caused mostly by porcupine, rabbit, and deer. Spruce plantations suffered comparatively less damage than the pines (Table 5).

White pine weevil and northern pitch twig moth reported at high levels in pine plantations were likely the major cause of the shoot and branch damage reported in Table 2.

Spruce bud moth was present in 25% of the spruce plantations. Spruce budworm was also reported but in only 11% of the plantations. Together they were likely responsible for the high degree of needle damage reported (Table 2).

Shoestring root rot was present in 10% of the pine and 15% of the spruce plantations. The disease was not found in the thinned areas.

Snow damage was significantly higher in the pine (42%) than in the spruce (17%) plantations.

In the thinned areas the most frequently observed problems were animal and mechanical damage and white pine weevil. Mechanical damage was reported in 41% of the thinned areas assessed. Damage caused by thinning operations provide infection sites for disease which can lead to decay.

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Forest Insect and Disease Survey
Forestry Canada - Maritimes Region

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